

EXPLANATION OF PLATE 3

All figures are drawn with aid of camera lucida. Scales for those of shells represent one millimeter; those of jaw and radular transverse row (10T) 50 microns (.05 mm.), that of radular teeth 20 microns; uppermost scale is for fig. 9, next for figs. 10T and 12 to 14, third for figs. 1 to 3, fourth for figs. 4 to 8 and lowest for fig. 10.

- Figs. 1-3. *Helicodiscus (Hebetodiscus) inermis*. Type shell.
- Figs. 4-6. *Pilsbryna aurea*. Type shell.
- Fig. 7. *P. aurea*. Half of basal view of larger shell, with base (accidentally) broken away to as to expose parietal lamella.
- Fig. 8. *P. aurea*. Basal view of columella, broken out of same shell as in Fig 7, to show columellar lamella.
- Fig. 9. *Gastrodonta (Clappiella) aldrichiana*. Jaw.
- Fig. 10. *G. aldrichiana*. Radula: central and 1st lateral in natural relations; also 5th, 7th and 10th teeth. 10T shows shape of right half of a transverse row, with positions of central axis, outer edge of 4th tooth and edge of ribbon indicated.
- Fig. 11. *Paravitrea (Paravitreops) variabilis*. Aperture of a half-grown shell from Walden Ridge, with one of the radial barriers.
- Figs. 12-14. *P. variabilis*. Type shell.

 FOSSIL FRESH WATER SHELLS FROM WINONA, COCONINO COUNTY, ARIZONA

HAROLD S. COLTON
University of Pennsylvania

Walnut Creek drains a large area south of the San Francisco Mountains in northern Arizona. After passing through a deep limestone canyon, famous for its cliff dwellings, it enters a shallow valley among black cinder cones near the railway station of Winona. This valley, about four miles long, is blocked in the middle by a low recent

volcanic cone perfect in outline. Walnut Creek shows some evidence of having been dammed by this eruption—a lake existing for a brief interval, until the stream cut its way around the east base of the cone.

The chief evidence for the presence of this lake lies in the molluscan fresh water fauna which the writer discovered in the sands and gravels exposed in the east wall of the arroyo about halfway between the highway bridge and the railway bridge west of the railway station of Winona. Below the cinder cone—for two miles the arroyo walls were explored—although land forms were encountered, no fresh water shells were found.

The shells, which were kindly identified by Dr. H. A. Pilsbry, are as follows

Valvata sp. An imperfect shell, with rounded whorls.

Physa sp. The mature shells were in fragments and the young were too small for identification.

Ferrissia parallela Say.

Planorbis parvus Say.

Psidium sp., near *huachucanum* Pils.

Euconulus fulvus (Drap.)

Zonitoides minusculus (Binn.)

Vallonia gracilicosta Reinh.

Succinea grosvenori Lea.

The four land shells last listed seemed to have been washed from upper layers on the bank and were apparently not buried in the gravel.

This fresh water fauna is notable because it indicates that in geologically recent time Walnut Creek contained permanent water. During the last twenty years a few heavy floods have passed down the valley but whole years have gone by without any water flowing. The presence of this fauna is another crumb of evidence supporting the hypothesis that in the recent past northern Arizona enjoyed a heavier rainfall than it does at the present day.